Improvements in and relating to engines and pumps having sliding vanes

Publication number: GB534339
Publication date: 1941-03-06
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Classification:
- International: ***F01C1/348; F01C21/08;*** **F01C1/00; F01C21/00;**
- European: F01C1/348; F01C21/08B2B2
Application number: GB19380029744 19391012
Priority number(s): GB19380029744 19391012

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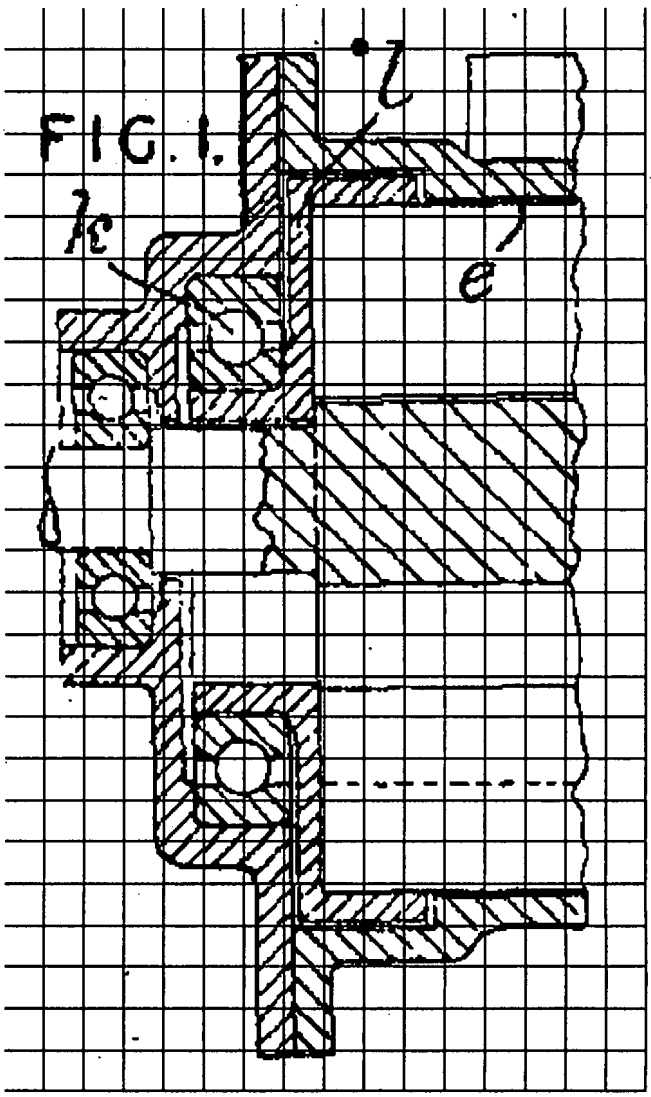
Abstract of **GB534339**

534,339. Rotary engines and pumps. RUBURY, J. M., HAMMOND, W. R., and HAMMOND ENGINEERING CO., Ltd. Oct. 12, 1939, No. 39744/38. [Class 110 (ii)] Fixed abutment type having outwardly-sliding vanes.-The ends of the tips of vanes e ride on the inner cylindrical surfaces of dished end plates l which are mounted on the inner members of ball-races k



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PATENT SPECIFICATION

534,339

Application Date : Oct. 12, 1939. No. 29744/38.

Complete Specification Accepted : March 6, 1941.

COMPLETE SPECIFICATION

Improvements in and relating to Engines and Pumps having Sliding Vanes

We, JOHN MEREDITH RUBURY, WILLIAM RICHARD HAMMOND, both British subjects, and THE HAMMOND ENGINEERING COMPANY LIMITED, a British Limited Liability Company, all of Titchfield Works, Chase Side, Enfield, in the County of Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in engines and pumps having sliding vanes arranged in a rotor journalled in a stationary casing of circular shape and provided with inlet and outlet passages and has for its object to provide means whereby the wear on the edges of the vanes is reduced and greater reliability of operation is obtained compared with that possible heretofore.

In the past it has been proposed to arrange engines and pumps of the kind having sliding vanes, a rotor, a stationary casing, end covering means for said casing and a driving shaft for the rotor, so that the pressure between the contact edges of the vanes and the inner surface of the stationary casing is limited by constraining the movement of said vanes due to centrifugal force towards the inner surface of said stationary casing by mechanical means which transmits such pressure to anti-friction devices sliding or rolling on a path concentric with the inner surface of said stationary casing.

Arrangements have been suggested in which a freely rotatable guide or restraining plate was mounted eccentrically with respect to the rotor shaft but concentrically in the casing at each end, each of said guide or restraining plates having a circular flange with an internal diameter corresponding to the diameter of the stationary casing arranged in recesses in said casing so as to cooperate with the free edges of the vanes. The guide plates respectively were mounted on the exteriors of the outer races of ball or roller bearings and it has been proposed positively to drive the guide plates by pins on the rotor cooperating with pins on the said guide plates.

We have found that it is possible to improve the arrangement described by mounting the guide plates respectively on the interiors of the inner races of ball or roller bearings.

This invention consists in an improved engine or pump of the kind having a circular casing and an eccentrically located rotor with sliding vanes controlled by guide or restraining plates and is characterised in that the guide or restraining plates are not driven positively, that the diameter of the bearings for said plates is small compared with the diameter of the circle of constrain and that each of the guide or restraining plates is mounted on the interior of the inner race of the ball or roller bearing by which it is journalled.

In order that the nature of this invention may be the better understood, an example is shown in the figures of the accompanying drawing and described hereinafter with reference to the letters applied to the various parts, similar letters being applied to those parts which are similar, or in some cases are mechanically equivalent, in the various figures, in which:—

Figure 1 is a fragmentary sectional elevation of a compressor constructed according to this invention; and

Figure 2 is an end elevation of a restraining plate with the rotor and blades shown dotted.

In the drawing only one half of a compressor is shown because the right hand part includes no feature of material importance other than as shown in the left hand part.

As is usual, the compressor comprises a stationary casing a, end covers such as a^1, a spindle b journalled in ball bearings such as c (one in each of the end covers a^1) disposed eccentrically to the inner surface of the casing a, a slotted rotor d mounted on the spindle b and four vanes e in the slots of the rotor d.

The stationary casing a is recessed at each end at a^3 to receive the circular flanges h of rotatable guide or restraining plates mounted on ball bearings k located in a recess a^4 in each of the end covers a^1.

Each guide or restraining plate comprises a disc l having a flange h and a flange l^1, the flange l^1 engaging the interior of the inner race k^2 of the ball bearing k the exterior of the outer race k^1 being fixed in a recess a^4 in an end cover a^1 as aforesaid.

The outer ends of the contact edge of each of the vanes e engages with the circular flanges h and may be maintained in this relation by bar elements including springs or not so as to maintain the edges of the vanes e in cooperation with the internal surfaces of the flanges h even at speeds too slow to provide the requisite centrifugal force.

In some cases the bar elements may be replaced by springs or may include springs in which the element consists of two parts sliding one in the other and having a spring so arranged as to tend under normal operative conditions to increase the effective length of the element.

By the arrangement described and shown it will be seen that the losses due to inertia are reduced and friction is minimised because by fixing the race k^1 in the recess a^4 and by applying motion to the race k^2 the speed of rotation of the circle of the centres of the balls or rollers about the axis of the casing a is only a fraction of what it would be if the race k^2 were fixed and motion was applied to the race k^1 (the fraction being the ratio of the diameter of the inner race to the diameter of the outer race when measured on the contact paths of the balls) in view of the planetary motion involved, so that the mass of the balls and usual cages is less likely to introduce a drag on the guide plates resulting in the edges of the vanes e slipping on the flanges h when the rotor d is accelerated or decelerated rapidly, than when motion is applied to the race k^2.

In the constructions described hereinbefore and shown in the drawings forming a part hereof ball bearings arranged mainly to support a radial load have been referred to but clearly such bearings may be modified simultaneously to resist an axial load or be augmented by bearings suited for that purpose.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. An improved engine or pump of the kind having a circular casing and an eccentrically located rotor with sliding vanes controlled by guide or restraining plates characterised in that the guide or restraining plates are not driven positively, that the diameter of the bearings for said plates is small compared with the diameter of the circle of constraint and that each of the guide or restraining plates is mounted on the interior of the inner race of the ball or roller bearing by which it is journalled.

2. An improved engine or pump according to claim 1, characterised in that each ball or roller bearing is arranged to resist a radial load, an axial load or a combined radial and axial load.

3. An improved engine or pump of the kind specified, arranged, constructed and operating substantially as described and shown in the accompanying drawing.

Dated this 12th day of October, 1939.

CHAS. J. R. BULLOUGH,
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29, Southampton Buildings,
London, W.C.2,
Agent for the Applicants.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1941.

[This Drawing is a reproduction of the Original on a reduced scale.]

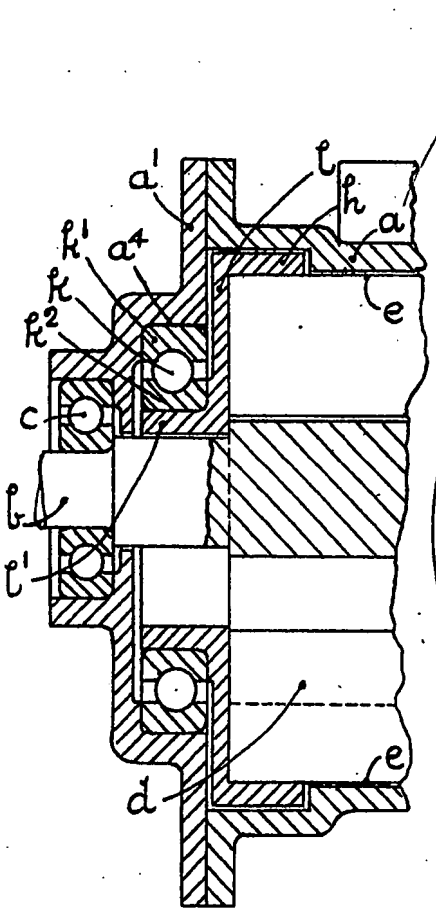

FIG 1

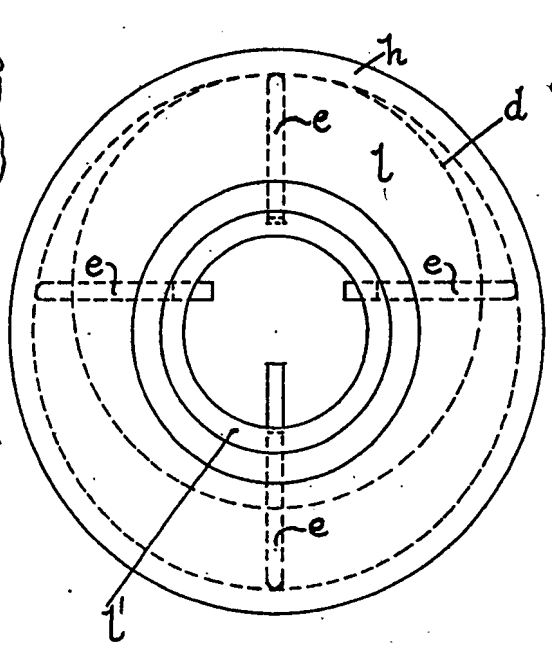

FIG 2

Malby & Sons, Photo-Litho.